

WHAT IS CLAIMED IS:

1 1. A one-piece field core shell that is formed from a disc having top
2 and bottom external surfaces comprising:
3 an outer annular ring, integral to and encircling a center axis of the
4 disc and extending from the bottom external surface in a direction
5 that is perpendicular to the bottom surface of the disc and parallel
6 to the center axis of the disc;
7 an inner annular ring integral to and encircling a center axis of the
8 disc, said inner annular axis spaced radially inward from said outer
9 annular ring and extending from the bottom external surface in a
10 direction that is perpendicular to the bottom surface of the disc and
11 parallel to the center axis of the disc; and
12 a mounting flange integral to the disc and having a bore extending
13 from the mounting flange to the bottom external surface of the disc.

1 2. The field core shell as claimed in claim 1 wherein the mounting
2 flange encircles a center axis of the disc and extends in a
3 perpendicular direction to the top external surface of the disc and
4 parallel to the center axis of the disc.

1 3. The field core shell as claimed in claim 2 wherein the bore is sized for
2 attachment to a shaft

1 4. The field core shell as claimed in claim 2 wherein said inner annular
2 ring and said outer annular ring form a wire winding pod having a
3 top surface, said wire winding pod having a hole through the top
4 surface of the wire winding pod to feed wire leads.

1 5. The field core shell as claimed in claim 2 wherein the inner annular
2 ring and the outer annular ring extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc by the same distance.

1 6. The field core shell as claimed in claim 2 wherein the inner annular
2 ring and the outer annular ring extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc and are tapered at an angle α .

1 7. The field core shell as claimed in claim 1 wherein the mounting
2 flange extends parallel to a plane of the top external surface of the
3 disc.

1 8. The field core shell as claimed in claim 7 wherein the bore is sized for
2 attachment to a shaft.

1 9. The field core shell as claimed in claim 7 wherein said inner annular
2 ring and said outer annular ring form a wire winding pod having a
3 top surface, said wire winding pod having a hole through the top
4 surface to feed wire leads.

1 10. The field core shell as claimed in claim 7 wherein the inner annular
2 ring and the outer annular ring extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc by the same distance.

1 11. The field core shell as claimed in claim 7 wherein the inner annular
2 ring and the outer annular ring extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc and are tapered at an angle α .

1 12. A one-piece field core shell comprising:
2 a stamped wire winding pod having a top surface, the wire winding
3 pod consisting of inner and outer annular rings; and
4 a mounting flange integral to the wire winding pod and having a
5 bore extending from the mounting flange and through the center of
6 the wire winding pod.

1 13. The field core shell as claimed in claim 12 wherein the mounting
2 flange is spin-roll formed.

1 14. The field core shell as claimed in claim 13 wherein the mounting
2 flange encircles a center axis of the wire winding pod and extends
3 in a perpendicular direction to the top surface of the wire winding
4 pod and parallel to the center axis of the wire winding pod.

1 15. The field core shell as claimed in claim 13 wherein the mounting
2 flange extends parallel to a plane of the top surface of the wire
3 winding pod.

1 16. The field core shell as claimed in claim 14 or 15 wherein the bore is
2 sized for attachment to a shaft.

1 17. The field core shell as claimed in claim 14 or 15 wherein said top
2 surface of said inner and outer annular rings having a hole through
3 the top surface to feed a wire lead.

1 18. The field core shell as claimed in claim 14 or 15 wherein the inner
2 annular ring and the outer annular rings are the same distance in
3 length.

1 19. The field core shell as claimed in claim 14 or 15 wherein the inner
2 annular ring and the outer annular ring are tapered at an angle
3 alpha.

1 20. Method for forming a one-piece field core shell having an inner and
2 an outer annular ring, and a mounting flange, which comprising the
3 steps of:

4 placing an annular disc sheet metal workpiece in a flow-forming
5 machine and supporting said workpiece with a headstock mandrel
6 and a mounting flange forming mandrel;

7 pressing a shaping roller against a side of said annular disc and
8 spinning said annular disc;

9 moving the shaping roller progressively radially inward against the
10 side of said spinning disc and displacing a portion of metal while
11 thinning part of the disc, forming said mounting flange;

12 removing said disc with said mounting flange formed and inverting
13 said disc by 180 degrees from its formed position;

14 placing said disc with said mounting flange formed, in said flow-
15 forming machine and supporting said workpiece with a mounting
16 flange mandrel and an inner annular ring forming mandrel;

17 pressing a shaping roller against a side of and spinning said annular
18 disc with the mounting flange formed;

19 moving the shaping roller progressively radially inward against the
20 side of the rotating disc with the mounting flange formed and
21 displacing a portion of metal while thinning part of the disc forming
22 said inner annular ring;
23 removing said disc with said mounting flange formed and inverting
24 said disc by 180 degrees from its formed position;
25 placing said disc with said mounting flange and inner annular ring
26 formed, in said flow-forming machine and supporting said
27 workpiece with a mounting flange mandrel and an outer annular
28 ring forming mandrel;
29 moving an outer annular ring forming tool radially inward against
30 the side of the rotating disc with the mounting flange formed and
31 the inner annular ring formed and displacing a portion of said metal
32 forming said outer annular ring; and
33 forming a bore and a hole to feed wire leads.

1 21. Method for forming a one-piece field core shell having an inner and
2 an outer annular ring, and a mounting flange, which comprises:
3 placing an annular disc sheet metal workpiece in a flow-forming
4 machine and supporting said workpiece with a headstock mandrel
5 and an inner annular ring forming mandrel;
6 pressing a shaping roller against a side of said annular disc and
7 spinning said annular disc;

8 moving the shaping roller progressively radially inward against the
9 side of said spinning disc and displacing a portion of metal while
10 thinning part of the disc, forming said inner annular ring;
11 removing said disc with said inner annular ring formed and inverting
12 said disc by 180 degrees from its formed position;
13 placing said disc with said inner annular ring formed, in said flow-
14 forming machine and supporting said workpiece with a inner
15 annular ring mandrel and an outer annular ring forming mandrel;
16 moving an outer annular ring forming tool radially inward against
17 the side of the rotating disc with the inner annular ring formed and
18 displacing a portion of said metal forming a radially extending
19 surface of the outer annular ring;
20 forming a mounting flange; and
21 forming a bore and a hole to feed wire leads.

1 22. Method for forming a one-piece field core shell having an inner and
2 an outer annular ring, and a mounting flange, which comprises:
3 placing an annular disc sheet metal with a hole in its center
4 workpiece in a flow-forming machine and supporting said
5 workpiece with a headstock mandrel and a mounting flange
6 forming mandrel;
7 forming a mounting flange;

8 pressing a shaping roller against a side of said annular disc and
9 spinning said annular disc;
10 moving the shaping roller progressively radially inward against the
11 side of said spinning disc and displacing a portion of metal while
12 thinning part of the disc, forming said inner annular ring;
13 removing said disc with said mounting flange and inner annular ring
14 formed and inverting said disc by 180 degrees from its formed
15 position;
16 placing said disc with said inner annular ring formed and mounting
17 flange formed in said flow-forming machine and supporting said
18 workpiece with a inner annular ring mandrel and an outer annular
19 ring forming mandrel;
20 moving an outer annular ring forming tool radially inward against
21 the side of the rotating disc with the inner annular ring formed and
22 displacing a portion of said metal forming said outer annular ring;
23 and
24 forming a bore and a hole to feed wire leads.

1 23. A field core shell formed by a method according to claims 20, 21 or
2 22.

1 24. The field core shell as claimed in claim 23 wherein the bore is sized
2 for attachment to a shaft.

1 25. The field core shell as claimed in claim 23 wherein the inner annular
2 ring and the outer annular rings extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc by the same distance.

1 26. The field core shell as claimed in claim 23 wherein the inner annular
2 ring and the outer annular ring extend in a direction that is
3 perpendicular to the bottom surface of the disc and parallel to the
4 center axis of the disc and are tapered at an angle α .

1 27. A field core shell which comprises:
2 a spin-roll formed outer annular ring integral to and encircling a
3 center axis of the disc and extending from the bottom external
4 surface in a direction that is perpendicular to the bottom surface of
5 the disc and parallel to the center axis of the disc;
6 a spin-roll formed inner annular ring integral to and encircling a
7 center axis of the disc, said inner annular axis spaced radially inward
8 from said outer annular ring and extending from the bottom
9 external surface in a direction that is perpendicular to the bottom
10 surface of the disc and parallel to the center axis of the disc; and

11 a spin-roll formed mounting flange integral to the disc and having a
12 bore extending from the mounting flange to the bottom external
13 surface of the disc.

1 28. A field core assembly comprising:

2 a wire winding pod having a top and bottom surface comprising an
3 outer annular ring integral to and encircling a center axis of the wire
4 winding pod and extending in a direction perpendicular to the
5 bottom of the wire winding pod and parallel to the center axis of
6 the wire winding pod, an inner annular ring integral to and
7 encircling a center axis of the wire winding pod, said inner annular
8 axis spaced radially inward from said outer annular ring and
9 extending in a direction perpendicular to the bottom of the wire
10 winding pod and parallel to the center axis of the wire winding pod;
11 a mounting flange that encircles a center axis of the wire winding
12 pod and extends in a direction perpendicular to the top surface of
13 the wire winding pod and parallel to the center axis of the wire
14 winding pod, the wire winding pod having a bore extending from
15 the mounting flange to the bottom of the wire winding pod and a
16 hole in the top surface of the wire winding pod to feed wire winding
17 leads;

18 wire windings located inside the wire winding pod having wire leads
19 feed through the hole in the top surface of the wire winding pod;
20 and
21 an electrical connector attached to the top surface of the wire
22 winding pod for connecting said field core assembly to an external
23 source.

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 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